

Materials for forming the chemical enhancer layer may include one of I (iodine)-containing liquid compounds such as CH_3I , $\text{C}_2\text{H}_5\text{I}$, CD_3I , CH_2I_2 etc., $\text{Hhfac}1/2\text{H}_2\text{O}$, Hhfac , TMVS , pure I_2 , I (iodine)-containing gas and water vapor, and is performed at the temperature ranging from about -20 to about 300°C for a time period ranging from about 1 to about 600 seconds. Also, the materials for forming the chemical enhancer layer may include F, Cl, Br, I, At of a liquid state and F, Cl, Br, I, At of a gas state, which are Group VII elements in the Periodic Table.

In view of the at least the above amendment and description, applicant respectfully requests that the rejections of claim 1, 7 and 9 under 35 U.S.C. § 112, second paragraph be withdrawn.

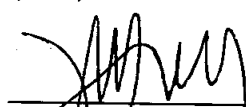
Further, applicant respectfully requests reconsideration and allowance of this application.

The Commissioner is authorized to charge any fee deficiency required by this paper, or credit any overpayment, to Deposit Account No. 13-2855.

Respectfully submitted,
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By:



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Reg. No. 35,902

Serial No.: 09/875,698
Group Art Unit: 1765

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Specification:

The paragraph beginning on page 4, line 17 has been replaced with the following rewritten paragraph:

--The chemical enhancer layer 60 is formed in thickness ranging from about 50 to about 500 Å. [Catalysts] Materials for forming the chemical enhancer layer 60 may include one of I (iodine)-containing liquid compounds such as CH₃I, C₂H₅I, CD₃I, CH₂I₂ etc., Hhfac1/2H₂O, Hhfac, TMVS, pure I₂, I (iodine)-containing gas and water vapor, and is performed at the temperature ranging from about -20 to about 300°C for a time period ranging from about 1 to about 600 seconds. Also, the [catalysts] materials may include F, Cl, Br, I, At of a liquid state and F, Cl, Br, I, At of a gas state, which are Group VII elements in the Periodic Table.--

In the Claims:

Claims 1, 5 and 7-10 have been amended, as follows:

1. (Amended) A method of forming a metal wiring in a semiconductor device, the method comprising:

providing a substrate with a lower metal layer overlying the substrate and an interlayer insulating film comprising first, second and third insulating films formed on the lower metal layer;

forming a damascene pattern comprising a trench and a via on the interlayer insulating film, a portion of the second insulating film forming a bottom of the trench, a portion of the lower metal layer forming a bottom of the via, the trench and the via each comprising a sidewall;

forming diffusion prevention film spacers on the sidewalls of the trench and the via;

selectively forming chemical enhancer [layers] layer on the portion of the second insulating film forming the bottom of the trench and on the portion of the lower metal layer forming the bottom of the via;

forming a copper layer on the diffusion prevention film spacer and chemical enhancer layers by means of chemical vapor deposition method;
and

performing a hydrogen reduction annealing and a chemical mechanical polishing process to form a copper metal wiring from the copper layer.

5. (Amended) The method of claim 1, wherein the diffusion prevention film spacer comprises at least [on] one material selected from the group consisting of ionized PVD TiN, CVD TiN, MOCVD TiN, ionized PVD Ta, ionized PVD TaN, CVD Ta, CVD TaN, CVD WN, CVD TiAlN, CVD TiSiN and CVD TaSiN.

7. (Amended) The method of claim 1, wherein the chemical enhancer [layers are] layer is formed in a thickness ranging from about 50 to about 500 Å, using a [catalyst] material, selected from the group consisting of I (iodine)-containing liquid compound, Hhfac1/2H₂O, Hhfac, TMVS, pure I₀, I (iodine)-containing gas, and water vapor at a temperature ranging from about -20 to about 300°C for a time period ranging from about 1 to about 600 seconds.

8. (Amended) The method of claim 7, wherein the [catalyst] material is an I (iodine)-containing liquid compound selected from the group consisting of CH₃I, C₂H₅I, CD₃I and CH₂I₂.

9. (Amended) The method of claim 1, wherein the chemical enhancer [layers are] layer is formed in a thickness ranging from about 50 to about 500Å, using a [catalyst] material selected from the group consisting of F, Cl, Br, I and At in a liquid state at a temperature ranging from about -20 to about 300°C for a time period ranging from about 1 to about 600 seconds.

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10. (Amended) The method of claim 1, wherein the chemical enhancer layers are formed in a thickness ranging from about 50 to about 500Å, using a [catalyst] material selected from the group consisting of F, Cl, Br, I and At in a gas state at a temperature ranging from about -20 to about 300°C for a time period ranging from about 1 to about 600 seconds.